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Lower Snake River Fish and wildlife Compensation Plan

by

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ABSTRACT

Anglers expended an estimated 39,522 hours to harvest 15,090 residualized steelhead averaging 9.0 in. total length from the upper Salmon River during the time period May 25 through July 23, 1985. It was estimated that 2.2% of the 786,186 normal-sized steelhead planted in the upper Salmon River became residualized compared to 1% for 1984 with normal-sized smolts and 13% for larger smolts.

Stocking methods evaluated in 1985 appeared suitable for needs. No excessive descaling on planted steelhead smolts was observed.

Stream surveys revealed limited potential for spawning in Allison Creek in 1985. A barrier to upstream migration was observed. Some steelhead spawning was noted in Little Slate Creek. Good habitat and riparian vegetation was noted in Slate Creek. A number of other tributaries in the lower Salmon River were studied as potential outplant sites for steelhead.

Juvenile density counts were made by snorkeling in Slate Creek and Whitebird Creek in the summer of 1985. In Slate Creek, the number of steelhead parr per 100 square yards ranged from 4.3 in section 4 to 76.5 in section 5. The mean number of parr per 100 square yards was 18.8. In Whitebird Creek, the number of steelhead parr per 100 square yards was 25.9, 57.3, and 20.5 for study sections 1, 2, and 3, respectively.

Documentation of Lower Snake River Hatchery programs is provided in this report including: juvenile fish output, return of adults to facilities, and oversight of major hatchery programs.

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INTRODUCTION

In Idaho, there are currently fish rearing operations under the Lower Snake River Compensation Plan (LSRCP) at McCall Hatchery, Dworshak National Fish Hatchery, Hagerman National Fish Hatchery, and Sawtooth Hatchery. Magic Valley Steelhead Hatchery is under renovation, and the proposed Clearwater Hatchery is in the planning stages (Fig. 1).

The success of each hatchery program will be determined ultimately by the number of returning adults, whether it be to the hatchery or to outplant sites. Many factors affect the return of adults: mortality due to stress at time of planting, time of release, length at release, residualism, commercial and sport fishing, environmental impacts, and most importantly, mortality at the dam sites for both downstream migrating smolts and upstream migrating adults. Passage at the dams has been improving, but increases in survival by reducing stress occurring during transportation or releasing the smolts at the optimum time and at the optimum length, or reducing the number of smolts that residualize, could improve the number of returning adults. Investigation of these opportunities to reduce unnecessary mortality is a major goal of this study.

Reduction of mortality due to stress caused by transportation is an area just beginning to be evaluated in Idaho. Most of this stress is due to the increase of metabolic wastes (ammonia, urea, uric acid, carbon dioxide), as well as other chemicals, in the hauling water. Leitritz and Lewis (1980) list four methods to reduce the effects of accumulating waste products:

1. Starvation of fish 24 to 48 hours prior to transportation.
2. Maintenance of low water temperatures.
3. Use of hypnotic drugs.
4. Removal of metabolic waste products through aeration and chemical buffers.

The method that has received the most investigation, recently, has been the use of hypnotic drugs. Hattingh et al. (1975) reported that survival rates for warmwater species were increased by the addition of 10% NaCl solution to the hauling water. Other researchers (McFarland and Norris 1958; wedemeyer 1972; Long et al. 1977; Carmichael et al. 1983; wedemeyer et al. 1985) have investigated the effects of various mineral salt solutions and tricaine methane sulfonate (MS-222) on survival of transported fish. wedemeyer et al. (1985) reported that 10 ppm of MS-222 was the best solution for hauling juvenile chinook salmon. He also suggested the benefits of using mineral salts may be negated by the corrosion of the equipment.

In the past, Idaho hatcheries have not used water treated with stress reducing solutions to haul anadromous fish (Steve Huffaker, personal communication). There is a need to determine if the successes reported by other agencies can significantly increase the number of adult steelhead and salmon returning to Idaho waters.

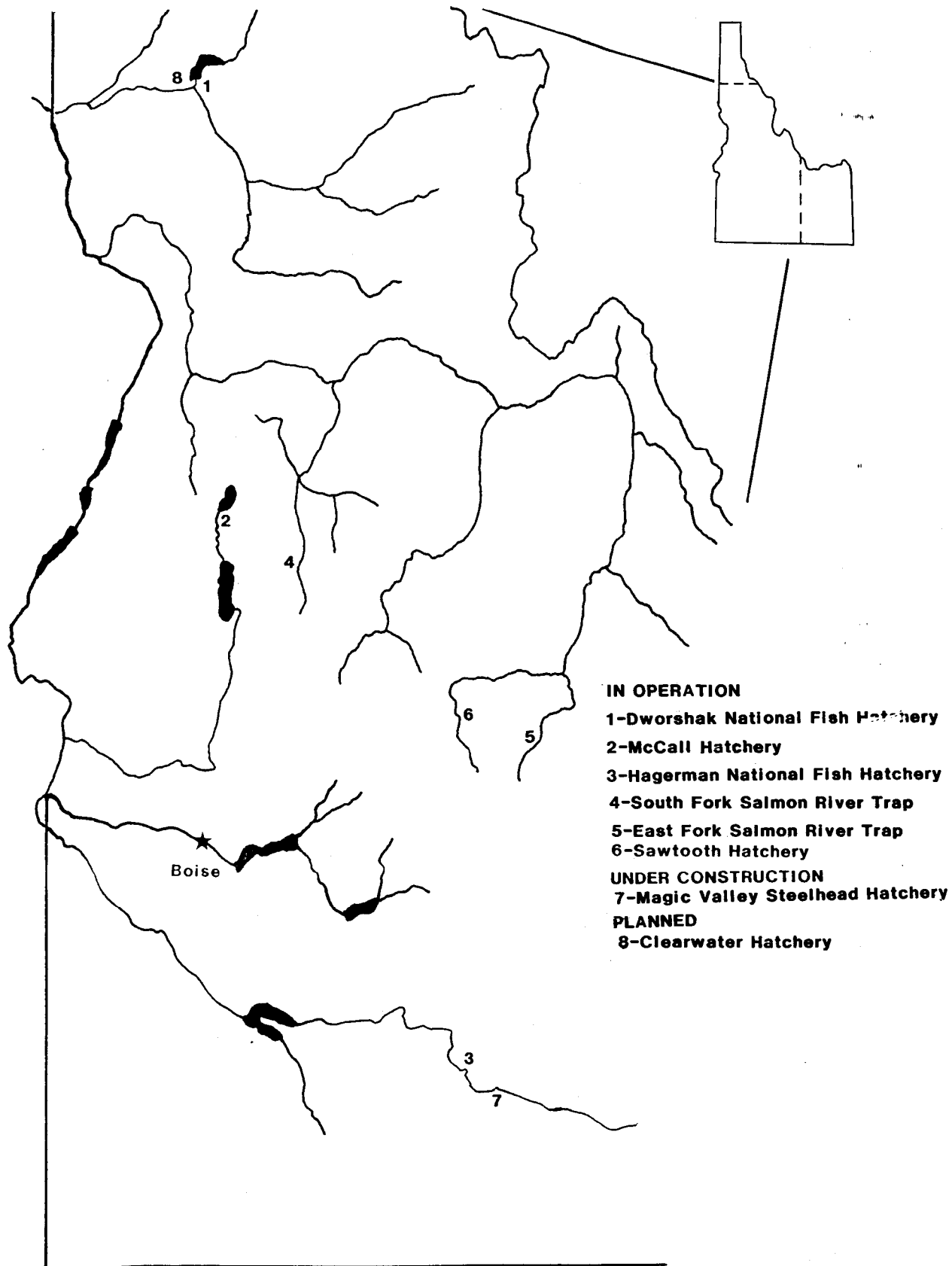


Figure 1. Location of Lower Snake River Compensation Plan facilities in Idaho.

Time of smolt releases appears to be another critical factor affecting migration success. Smolt migration occurs from April through June with peak migration occurring between mid-April through mid-May (Chrisp and Bjornn 1978). This time frame usually corresponds to peak spring runoff. Each subgroup of smolts, as well as each release site, may have a precise optimum time for release. Determination of this critical time is necessary for each smolt group and outplant site to ensure maximum number of returning adults. Length at time of release is also critical to the number of smolts that migrate (Chrisp and Bjornn 1978; Bjornn et al. 1979; Reingold 1979). The parr-smolt transformation occurs most often between 140 mm and 180 mm (TL) (Wagner et al. 1963; Chrisp and Bjornn 1978). Partridge (1985) determined that length of smolts does effect downstream survival. Therefore, continued monitoring of smolt length at time of release is necessary.

Length at time of release also seems to affect the percentage of smolts that residualize, which may ultimately affect the number of returning adults (Chrisp and Bjornn 1978). Partridge (1985) suggests residualism as high as 29% (based on estimates extracted from Chrisp and Bjornn 1978) could occur. Partridge (1985) estimated 80% of residual smolts were male and that 72% of these were immature.

Another phase of hatchery oversight is to determine the success of smolt outplants at sites that do not have permanent collection facilities. Therefore, it is necessary to determine the number of returning adults through the use of temporary collection facilities. Because one of the goals of the LSRCP is to increase anadromous fish runs to preproject levels, it is necessary to determine the success of spawning of hatchery adults. This may be accomplished through juvenile density counts (Johnson 1985, Thurow 1985). When a stream becomes fully seeded, the decision to transfer smolt outplants to other suitable sites could be made. This knowledge (number of returning adults and corresponding juvenile density estimates) is necessary to best utilize the limited resources.

OBJECTIVES

1. To provide a documentation of the LSRCP funded fish-rearing activities in Idaho and the resulting adult returns.
2. To develop and provide an ongoing evaluation of major operational guidelines of LSRCP hatchery activities. in Idaho.
3. To provide an oversight of major hatchery operational practices.
4. To coordinate research and management programs with hatchery capabilities.

RECOMMENDATIONS

Continue smolt plants in Slate Creek at the same rate as 1983 and 1984 (32,000 yearly).

Reevaluate anadromous fish planting in Allison Creek due to apparent fish passage problems.

METHODS

Residualized Steelhead Sampling

To monitor residualized steelhead, angler surveys were made on a 40-mile reach of the Salmon River and on the lower six miles of Valley Creek (Table 1). This section of the river meanders through the lower portion of the Sawtooth Valley and is further described in Partridge (1985).

Steelhead smolts remaining in the release area in excess of a month were considered residualized fish. These fish were sampled during the two four-week intervals to determine the numbers of residualized fish, length of time they remained in the system, dispersal from the release site, and size ranges of the residualized steelhead. The sampling method consisted of a stratified random angler survey.

The survey began with the opening of the fishing season on May 25 and continued through July 23, 1985. The survey was stratified by four-week intervals, by day type (weekday, weekend, and holiday), and by stream location. Weekends which occurred in conjunction with a holiday were considered as holidays. Within each interval, 50% of the weekends, 40% of the weekdays, and all holidays were selected as count days. Each day was partitioned into four equal count periods, and four counts were conducted over each two-day period. Count periods were selected so that each different period type (early morning, late morning, afternoon, evening) received one count during the two-day period. Counts were made by driving along the length of the study area and counting angler vehicles. Vehicles in campgrounds were not counted unless a party was observed fishing.

Calculation of effort and harvest for each interval was calculated using the methods described by Rieman (1983) with a modification for vehicle counts (B. Rieman, IDFG, personal communication). Mean angler vehicles per day for each study section in each interval was calculated as:

5

$$Y_i = \frac{1}{N} \sum_{i=1}^L N_i Y_i$$

Table 1. Location and length of angler harvest survey study sections on the upper Salmon River.

| Study section | Section boundaries | Length miles |
|-----------------|---|--------------|
| U3 ^a | Pettit Lake road on Alturas Lake Creek and county line bridge to Hell Roaring Creek | 4.1 |
| U2 | Hell Roaring Creek to Williams Creek | 7.5 |
| U1 | Williams Creek to 110 yards above release site | 2.6 |
| R | 110 yards above and 110 yards below release area | 0.1 |
| D1 | 110 yards below release area to steel bridge | 3.1 |
| D2 | Steel bridge to Valley Creek | 7.2 |
| D3 | Valley Creek to Basin Creek | 8.4 |
| D4 | Basin Creek to Sunbeam Dam | 5.4 |
| V | Valley Creek from Stanley Lake Creek to the Salmon River | 6.5 |

^aIncludes both lower Alturas Lake Creek and a portion of the Salmon River.

where: N_i = the number of days per day type 1,
 Y_i = the mean number of angler vehicles per day type i,
and
 N = the total days in the interval (28).

The total angler hours for each section in each interval were estimated as:

$$T_i = Y_i A_i D_i$$

Total effort for the interval and for the season was estimated as the sum of the study sections and the sum of the intervals.

Smolt Outplant Monitoring

Steelhead smolt plants were made in East Fork Salmon River and Hazard Creek between March 20 and April 30, 1985. All stock originated at Hagerman National Fish Hatchery. All hatchery-reared smolts were given an adipose fin clip to distinguish them from wild stocks. Groups of approximately 20,000 smolts were tagged with a coded wire tag inserted into the snout of the fish. The tagged smolts had a left ventral fin clipped to indicate a coded wire tag.

It was necessary to tag a sample of each experimental group of smolts planted to determine the percentage of returning adults. Test groups released in 1985 include time of release tests for steelhead smolts and transportation tests. One tagged group was hauled in a 5% isotonic saline solution (pro polyaqua), and another group was freeze branded (not tagged). A sample of 300 smolts from each tagged or freeze branded group released in 1985 was measured for total length. Tag returns from these plants will be totaled over the next four years and reported in future yearly reports.

In addition, steelhead smolts were checked on two occasions for descaling using methods described by Scully (1983). Samples were taken during stocking at the East Fork trap and at Sawtooth Hatchery. Various smolt outplant sites and potential outplant sites were also evaluated in 1985. Observations were generally qualitative in nature and included observations of presence of major barriers, substrate evaluations, riparian habitat, and general habitat conditions that could limit the size and scope of planting. Evaluations were made as time allowed and are by no means complete..

Adult Steel head and Redd Counts

Two streams, Slate Creek and Allison Creek, were sites of steelhead B smolt plants in 1983 and 1984 from stock reared at Dworshak National Fish Hatchery. Adult one-ocean fish were expected to return this year (1985) to these streams. Detection of returning hatchery and wild adult steelhead was made by observing selected areas of the stream

every other day beginning April 10, 1985. Observations for Allison Creek were made along the lower 0.5 mile of stream. Observations for Slate Creek were made along the lower 13 miles of stream with the effort concentrated in stream miles 10-13. An attempt was made to determine if observed adult steelhead were wild or hatchery stock. Dates and times of observation were recorded. Number and locations of steelhead redds were also recorded.

Juvenile Density Counts

Snorkeling has been shown to give accurate estimates of steelhead parr (Griffith et al. 1981; Edmundson et al. 1968; Schill and Griffith 1984; Northcote and Wilkie 1963; Goldstein 1978; Thurow 1985; Johnson 1985). The snorkeling technique used to count parr was similar to that described by Thurow (1985). One or two passes, depending on visibility and stream width, were made by one or two divers moving upstream. The observed fish were divided into 3-inch length groups between 0 and 12 inches and counted for each species present.

These counts were conducted on two streams, Slate Creek and Whitebird Creek. Five study sections were selected on Slate Creek: two sections were selected in the main stream, one near the mouth, one near the confluence of main Slate and Little Slate, and the fifth section was located in Little Slate Creek Meadow. Three sections were selected in Whitebird Creek, one section was on each of North Fork and South Fork Whitebird creeks near their confluence and the third was located near Twin Cabins on the South Fork Whitebird Creek (a meadow area). Each section was selected for ease of access and for representative habitat. The length of each section was approximately 10 to 15 times the mean stream width. Width measurements were taken every 10 yards. The type of habitat (pool, run, pocket water, or riffle) was determined for the right, left, and middle sections of the stream along the width measurement transect. Other data collected for each section included: substrate composition, gradient, vegetation, land use, and total area.

Juvenile densities and fish per square meter were calculated for each length group of each species and for the total number of fish counted in each study section.

Little Salmon River - Residualism

Steelhead smolts were planted in Hazard Creek, a tributary of Little Salmon River, 10 yards above the confluence. Angler interviews were conducted from May 25 to June 25, 1985. Data recorded included total length and presence of adipose or left ventral fin clips.

Hatchery Oversight

Oversight of hatchery operations was again a major project goal in 1985. Hatchery facilities are fully described by Partridge (1984 and Rohrer (1985). Much of the information for this section of the report was provided by the respective Hatchery Superintendents. In addition, several trips to LSRCP facilities were made in 1984-85, and regular coordination meetings are held each year.

RESULTS AND DISCUSSION

Residualized Steelhead Sampling

A total of 786,186 "A" strain steelhead were released into the upper Salmon River at Sawtooth Hatchery during 1985. Included in this total was a coded wire tagged group (10/26/30) of 40,475 steelhead (mean TL = 8.4 in.) released on April 9. An estimated 15,090 steelhead were harvested by anglers during the angler survey period (May 25 through July 23) in 1985 (Table 2). Partridge (1986) estimated that 86% of the total harvest occurred during the first two months of the season. Therefore, we estimated that as many as 17,546 steelhead smolts could have been harvested in 1985.

The residualism rate was estimated at 2.2% for steelhead planted in the upper Salmon River in 1985. This compared to 1% in 1984 for comparable size smolts.

Smolt Outplant Monitoring

On March 25, a group of spring chinook salmon reared at McCall Hatchery was stocked in the Salmon River (water temperature at 40 F) at Sawtooth Hatchery. These fish were in excellent condition at the time of planting and no descaling was noted. After planting through the 1,200 foot hatchery pipe used for such stocking, a sample size of 217 fish was again checked for descaling. No chinook were considered descaled.

On March 26, a group of steelhead "B" strain reared at HNFH was planted in the East Fork of the Salmon River (water temperature 40 F). Of 100 fish checked from the truck, 3% were considered descaled. A sample of different groups of 100 fish checked after passage through the pipe revealed 2% descaling. It was considered that there was no significant change in the descaling rate as a result of stocking steelhead through the system used at the East Fork trap.

Table 2. Estimated total angler hours, harvest, and harvest rates, and mean total length for residualized steelhead for the upper Salmon River, Idaho, 1985.

| Census interval | Angler hours | Mean length (in) | Residualized steelhead harvested | Harvest rate (fish per hour) |
|-----------------|--------------|------------------|----------------------------------|------------------------------|
| 5/25 - 6/21 | 13,612 | 9.0 | 10,678 | 0.78 |
| 6/22 - 7/23 | 25,910 | 9.2 | 4,412 | 0.17 |
| Totals | 39,522 | 9.0 | 15,090 | 0.38 |

All tagged groups (six) of steelhead smolts were monitored for total length (Appendix A). Mean total length of all groups was 8.4 in. A total of 270,208 "B" steelhead smolts were planted in the East Fork Salmon River and 308,103 "A" steelhead smolts were planted in Hazard Creek between March 24 and April 29, 1985.

Stream Surveys

Allison Creek

This creek is a small tributary of the Salmon River with its headwaters located on the south side of Nut Basin in Idaho County. A small hydropower facility has been proposed for Allison Creek (Hydroproject FERC #7383). Mean width is approximately 6 feet, and mean depth is between 9 and 12 inches. Substrate consists of embedded gravel, cobble, and small boulders. Spawning gravel is limited. There were some pools created by windfalls. Water temperatures ranged between 41 F on April 24, 1985 to a high of 57 F on May 5, 1985 with mean temperature 48 F. There was a large sandy staging area at the mouth of Allison Creek with the depth influenced by the Salmon River.

Approximately 100 feet above the confluence was a road culvert with a fish ladder installed by the Forest Service within the past three years. There was a plunge pool 2.5 feet deep below the culvert. There was a 6.7 foot irrigation diversion with no jump pool at mile 1.0 above the confluence. Fish passage is apparently prohibited beyond this point during parts of the year (Fig. 2).

My recommendation is to evaluate anadromous fish stocking due to fish passage problems beyond 1.0 mile of stream.

Slate Creek

Slate Creek is a tributary of the Salmon River. It is 13.5 miles from the confluence with the Salmon to the confluence with Little Slate Creek which doubles the water volume in Slate Creek. An environmental assessment report was developed by the USFS, Nez Perce National Forest (Anonymous 1980). Hydropower projects, FERC #7384 and FERC #7379, have been proposed for Little Slate Creek. Average width is between 30 and 40 feet, and mean depth was unknown. It had a moderately high gradient with substrate of large and small boulders, cobble, and some gravel. Numerous plunge pools and back water pools occurred along the stream. There are a few large riffle areas and a few large glide and run areas. Above the North Fork Campground, the creek braids in a few locations. The number of channels varies between two and four. Substrate at these locations consisted of cobble and gravel. Water temperatures ranged between 40 F on May 5 to a high of 50 F on May 16. Mean temperature was 46 F.

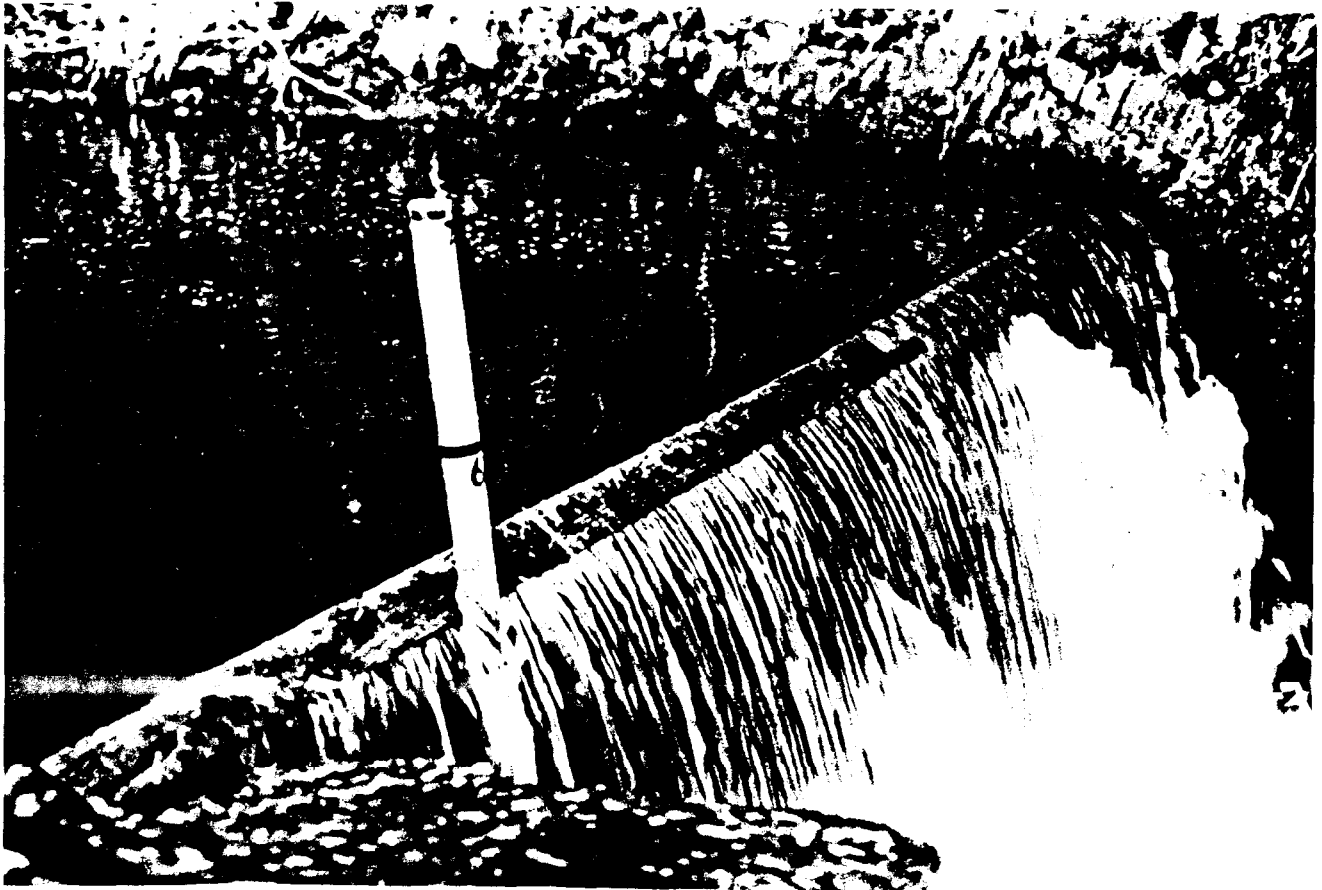


Figure 2. Barrier to upstream migration to Allison Creek, tributary to the Salmon River, Idaho.

Little Slate Creek

Approximately 500 yards above the confluence with main Slate Creek, the stream braids into three channels and appears to have potential as spawning habitat, although, no redds were observed. The headwaters of this creek begin in Little Slate Saddle. The stream flows through a five mile long meadow that has excellent potential to provide spawning habitat but needs some habitat restoration. This area is heavily silted.

My recommendation is to rehabilitate potential spawning area and stock presmolt steelhead in the meadow to re-establish the steelhead run.

Lake Creek

The mouth of Lake Creek fans out and flows through large boulders. The main channel is narrow and shallow. Mean width of the stream is between 10 and 15 feet. It has a high gradient with a series of cascades and small pools. No spawning habitat was observed in the first mile of stream. At mile 1, a 7-foot water fall with a 3 to 4 foot deep plunge pool appears to be a barrier to fish passage. Potential spawning habitat occurs above the barrier.

My recommendation is to investigate the removal of the barrier.

Partridge Creek

The mouth of this stream fans out and flows through large boulders. The main channel is narrow but deep. It has a high gradient with several small pools and cascades. No spawning habitat was observed. Stream width averaged between 10 and 15 feet.

This stream has low potential for an outplant site.

Elkhorn Creek

This stream fans out at the mouth. Width of stream is 6 to 8 feet. There is a very high gradient with boulders and cascades as the dominant feature.

This stream has poor potential as an outplant site.

French Creek

The first mile of stream consists of small cascades and large pools and a moderate to high gradient. Stream width was 15 to 20 feet. No spawning habitat was observed.

The stream has good potential for an outplant site, but needs further investigation. Its location would provide a good site for a terminal fishery.

Stream Surveys - Summary

Little change to the natural habitat has occurred on Lake, Partridge, Elkhorn, and French creeks. The confluences of Lake, Partridge, and Elkhorn creeks fan out through large boulders with a steep gradient into the Salmon River and would probably be unsuitable for the reproduction of a steelhead run, although Lake and Partridge creeks may be suitable as sites to plant smolts with the purpose of providing fish for the fishery in the Riggins area. Of the four streams surveyed, French Creek, has the best potential for an outplant site to establish a reproducing run of steelhead, although the steep gradient may be a potential problem. A forest fire in 1985 may have adverse effects on French Creek so additional habitat information will be necessary. There have been hydroelectric power projects proposed for Lake, Partridge, Allison, and Little Slate creeks.

Adult Steelhead and Redd Counts.

There were only two sightings of steelhead adults in Slate Creek. The first sighting occurred May 19 approximately 100 yards above Trough Creek, a tributary of Slate Creek. There were three to five adults observed constructing a redd and spawning in a side channel. Origin, wild or hatchery, could not be determined.

The second sighting occurred on June 2, 1985 approximately 0.45 miles upstream from Trough Creek. At this point, Slate Creek divided into two channels, a main channel and a smaller side channel. Two wild adult steelhead were observed constructing a redd and spawning on the left side of the side channel. Due to the lack of moisture, this redd eventually dried out.

There were no sightings of adult steelhead in Allison Creek, nor were there any signs of redd construction.

Juvenile Density Counts

The majority of stream habitat in Slate Creek study sections was pocket water (Table 3). The gradients of the study sections ranged from 0.5% to 5%.

In Slate Creek, the number of steelhead parr per 100 square yards ranged from 4.3 in section 4 to 76.5 in section 5. The mean number of steelhead parr per 100 square yards was 18.8 (Table 4). Other species observed included mountain whitefish (Prosopium williamsoni), bull trout (Salvelinus confluentus), and brook trout (Salvelinus fontinalis). Only three age 0 chinook salmon were observed in section 2. Two adult chinook were observed in sections 2 and 4.

The major stream habitat in Whitebird Creek was pocket water with a few pools and riffles. The gradients for sections 1, 2, and 3 were 3.5%, 4.0%, and 1.0%, respectively (Table 5). The number of steelhead parr per 100 square yards was 25.9, 57.3, and 20.5 for study sections 1, 2, and 3, respectively (Table 6).

Little Salmon River - Residualism

A total of 188 residualized steelhead smolts were measured from May 25 to June 25, 1985. Mean total length was 8.7 in. Twenty-seven percent of these smolts had adipose and left pelvic fin clips; mean length was 9.0 in. One hundred thirty-eight smolts (73%) had just an adipose fin clip; mean length was 8.6 in.

Hatchery Oversight

McCall Hatchery

The summer chinook salmon reared at McCall Hatchery were released at the Knox Bridge on the South Fork of the Salmon River in April (Table 7). Of the 564,405 smolts released, 78,200 had received adipose fin clips and coded wire tags for contribution evaluations. A total of 38,100 with tag code 10/25/18 were released and 40,100 with tags 10/26/83. Also, of the fin clipped fish, 25,600 received an R.D. "R"-3 freeze brand. These fish had a 91.78% eye-up, and 85.93% survived to release. Design capacity at full production calls for a release of 1,000,000 smolts at 15 to 20 per pound.

All of the fish were in excellent health at the time of release. The summer chinook were 19.1/lb. and 5.2 in. fork length. The spring chinook were 22.6/lb. and 4.8 in. fork length. Both types of chinook were sampled for incidence of various diseases two months prior to release. Infectious pancreatic necrosis was found in the summer chinook, and bacterial kidney disease was found in both stocks. However, samples taken immediately prior to release showed negative for

Table 3. Description and location of study sections on Slate Creek.

| Section | Location | Length (yards) | Mean width (yards) | Area (yd ²) | Gradient % | Substrate | Stream habitat | Major land use | Streamside vegetation |
|---------|--|-------------------|--------------------------|----------------------------|---------------|--|---|---|---|
| 1 | Begins at 2nd bridge 200 m upstream from confluence w/Salmon River | 260 | 12.5 | 2,631 | 2.5 | Boulder 6– 23 in., cobble | Pocket water, run, 1 pool, 1 riffle | Residential small grazing and farming | Cottonwood dogwood, hawthorns, alder |
| 2 | Slate Creek – begins 200 m above Trough Creek | 89 | 14.n | 1,151 | 1.0 | Boulders 9 in. cobble and gravel | Run with 1 small pool | Timbering and recreation | willow, fir, pine, alder |
| 3 | Main Slate Creek begins at bridge 30 m above confluence of Little Slate Creek | 108 | 9.1 | 899 | 5.0 | Boulder 4– 40 in., cobble and gravel | Pocket water | Timbering and recreation | Fir, pine, hawthorns, serviceberry |
| 4 | Little Slate Creek ends at foot bridge on trail #301 | 159 | 11.7 | 1,714 | 2.5 | Boulder 4– 68 in., cobble | Packet water | Timbering recreation | Fir, pine, yew, alder, dogwood |
| 5 | Little Slate Creek begins at confluence with Victor Creek Little Slate Meadow | 94 | 2.R | 244 | 0.5 | Sand, silt, some gravel | Run and pools | Heavy grazing, timbering and mining | Fir and pine |

Table 4. Juvenile steel head density counts for Slate Creek, 1985.

| | | Length (in.) | | | | | |
|---------|--------------------------------|--------------|------|------|-------|--------|--------|
| Section | | 0-3 | >3-6 | >6-9 | >9-12 | >12-14 | Total' |
| 1 | Number of fish present | | 20 | 75 | 12 | 4 | 111 |
| | Fish per 100 yard ² | | 0.8 | 3.1 | 0.5 | 0.2 | 4.5 |
| | Number of fish present | | 32 | 11 | 6 | 0 | 49 |
| | Fish per 100 yard ² | | 3.0 | 1.0 | 0.6 | 0 | 4.6 |
| 3 | Number of fish present | | 23 | 19 | 1 | 0 | 43 |
| | Fish per 100 yard ² | | 2.7 | 2.3 | 0.1 | 0 | 5.1 |
| 4 | Number of fish present | | 38 | 27 | 3 | 1 | 69 |
| | Fish per 100 yard ² | | 2.4 | 1.7 | 0.2 | 0.1 | 4.3 |
| 5 | Number of fish present | | 78 | 25 | 0 | 0 | 173 |
| | Fish per 100 yard ² | | 30.9 | 34.5 | 11.1 | 0 | 76.5 |

Table 5. Description and location of study sections on Whitebird Creek.

| Section | Location | Length (yards) | Mean width (yards) | Area (yd ²) | Gradient % | Substrate | Stream habitat | Major land use | Streamside vegetation |
|---------|--|-------------------|--------------------------|----------------------------|---------------|-------------------------------------|-------------------|-------------------|--|
| 1 | N. Fork Whitebird Cr. at confluence with S. Fork Whitebird Cr. | 102 | 6.4 | 605 | 3.5 | <u>Small boulder and cobble</u> | Pocket water | Grazing | Hawthorne, cottonwood, alder, pine |
| 2 | S. Fork Whitebird Cr. 100 m upstream from confluence with N. Fork Whitebird | 93 | 5.8 | 501 | 4.0 | Small boulder and cobble | Pocket water | Grazing | Hawthorne, cottonwood, pine, alder |
| 3 | S. Fork Whitebird Cr. at Twin Cabins – 200 m downstream | 121 | 7.6 | 847 | 1.0 | Silt and cobble | Run and pool | Timbering | Pine, fir |

Table 6. Juvenile steelhead density counts for Whitebird Creek, 1985.

| Section | | Length (in.) | | | | | Total" |
|---------|--------------------------------|--------------|------|------|-------|--------|--------|
| | | 0-3 | >3-6 | >6-9 | >9-12 | >12-14 | |
| 1 | Number of fish | 36 | 107 | 2 | 0 | 0 | 145 |
| | Fish per 100 yard ² | 6.0 | 19.1 | 0.4 | 0 | 0 | 25.6 |
| 3 | Number of fish | 112 | 95 | 53 | 6 | 0 | 266 |
| | Fish per 100 yard ² | 24.1 | 20.4 | 11.4 | 1.3 | 0 | 57.3 |
| | Number of fish | 9 | 88 | 61 | 3 | | 161 |
| | Fish per 100 yard ² | 1.1 | 11.2 | 7.8 | 0.4 | 0 | 20.5 |

Table 7. McCall Hatchery summer chinook salmon production for the South Fork Salmon River.

| Brood year | Number of smolts released | Number per pound | Release dates | Rearing history |
|------------|---------------------------|------------------|-------------------|--|
| 1978 | 124,800 | 13.0 | April 21-23, 1980 | Adults trapped at Little Goose Dam, spawned at Rapid River Hatchery, eggs shipped to Mackay and McCall hatcheries, McCall fish transferred to Mackay due to construction, fish returned to McCall then released into SFSR. |
| 1979 | 248,926 | 17.5 | April 6-7, 1981 | Adults trapped at Lower Granite Dam, spawned at Dworshak NFH, eyed eggs shipped to McCall Hatchery. |
| 1980 | 122,247 | 17.8 | April 8-10, 1982 | About 50% of the fish were from adults trapped at Lower Granite Dam and spawned at Dworshak NFH, eyed eggs transferred to McCall. The rest were from fish spawned at the SFSR facility and shipped to McCall Hatchery. |
| 1981 | 183,896 | 20.3 | April 4-7, 1983 | Adults trapped and spawned at SFSR facility, eggs and fish reared at McCall Hatchery. |
| 1982 | 269,880 | 15.6 | April 9-11, 1984 | Same as 1981. |
| 1983 | 564,405 | 19.1 | April 1-4, 1985 | Same as 1981. |

IPN virus. No other infectious pathogens were found, and very little mortality was experienced at this time.

The summer chinook salmon run to the South Fork trap in 1985 was the largest since the trap was installed (Table 8). A total of 2,237 adults and Jacks returned. Four hundred seventy-seven females were spawned to give 2,002,475 eggs. We had 1,552,000 eggs eye-up for a 77.5% eye-up percentage. Four coded-wire tagged groups returned to the South Fork trap in 1985 (Table 9). Control groups and vaccinated groups appeared to yield similar returns. A chi-square test of return $\chi^2_{.05(1)}$ revealed no significant difference in returns for tag groups 10/24/12 and 10/24/13.

The 1984 brood year resulted in 1,225,000 eyed summer chinook salmon eggs. These fish are currently in excellent shape with an 87.4% survival rate from eye-up to 30.4 fish per pound size (4.1 in.). Fifty thousand seven hundred and eighty-five of these fish received adipose fin clips and coded wire tags, and of the tagged fish, 43,487 also received a R.D. "Y"-3 freeze brand.

The spring chinook salmon reared at McCall Hatchery were released at the Sawtooth Hatchery site on the Salmon River. Of the 420,060 smolts released in March, 79,350 had received adipose fin clips and coded wire tags (41,200 10/26/34; 38,150 10/26/35). Also, of the fin clipped fish, 39,875 had received a R.D. "R"-1 freeze brand. These fish had an 82.8% eye-up and a 48% survival from eye-up to release.

Dworshak National Fish Hatchery

A total of 1,137,139 spring chinook salmon were released from Dworshak National Fish Hatchery in 1985 (Table 10). Design capacity at full production calls for 1,050,000 smolts released at 15 to 20 per pound. All fish were released into the main stem Clearwater River after dark on April 3-4 to prevent possible predation problems. Cooperation with the Reservoir Control Center allowed higher North Fork Clearwater flows from 6 to 12 p.m. each night to flush smolts downriver. By April 5, Idaho Department of Fish and Game personnel reported approximately 600,000 smolts past the Clearwater smolt monitoring trap near Lewiston.

This year's program utilized two chinook stocks started on feed at Dworshak. Once fish were transferred to raceways, a strict rearing regimen was adopted to ensure optimum fish size and health at release. Periodic fish health exams conducted by the Dworshak Fish Health Center showed little BKD incidence or mortality to release. Length frequency analysis indicated a normal population with little size variation observed. Overall, fish quality was judged to be excellent.

Approximately 40,000 chinook were freeze branded (R.D. "R"-1) on March 27 as part of the water budget program. All remaining fish were not marked.

Table 8. Trapping summary of adult summer chinook salmon on the South Fork Salmon River.

| Year | Weir installed | Weir removed | Males | | Females | Total | Released upstream | |
|------|----------------|--------------|---------|--------------------------|--------------------------|---------------------------|-------------------|---------|
| | | | 1-ocean | 2- & 3-ocean | | | Males | Females |
| 1980 | July 19 | September 10 | 186 | 148 (80) ^a | 46 (161) ^a | 380 (241) ^a | 209 | 21 |
| 1981 | July 8 | September 14 | 124 | 206 | 194 | 524 | 167 | 60 |
| 1982 | July 20 | September 7 | 48 | 306 | 196 | 550 | 112 | 45 |
| 1983 | July 12 | September 4 | 505 | 192 | 240 | 937 | 161 | 55 |
| 1984 | July 9 | September 5 | 595 | 431 | 503 | 1,529 | 213 | 124 |
| 1985 | June 19 | September 10 | 828 | 514 | 895 | 2,237 | 373 | 400 |

^aSummer chinook salmon trapped at Lower Granite Dam and held at Dworshak National Fish Hatchery.

Table 9. Coded wire tag returns for marked groups of summer chinook salmon returning to the South Fork Salmon River.

| Tag code | Year released | Number tagged released | Number per pound | Purpose | 1982 returns | | 1983 returns | | 1984 returns | | 1985 returns | | Total returns | Percent |
|-------------|------------------|------------------------------|------------------------|--------------------------|--------------|--------------------|--------------|--------------------|--------------|--------------------|--------------|----------------------|------------------|---------|
| | | | | | SFSR trap | Other ^a | SFSR trap | Other ^s | SFSR trap | Other ^s | SFSR trap | Other ^{a,b} | | |
| 10/21/17 | 1981 | 40,450 | 17.5 | Control | 6 | 0 | 28 | 0 | 10 | 0 | 0 | 0 | 44 | 0.109 |
| 10/21/18 | 1981 | 40,850 | 17.5 | Vibriosis Vaccination | 3 | 0 | 18 | 0 | 21 | 0 | 0 | 0 | 42 | 0.103 |
| 10/21/28 | 1981 | 47,625 | 17.5 | Placebo Vaccination | 5 | 0 | 20 | 0 | 15 | 0 | 0 | 0 | 40 | 0.084 |
| 10/24/12 | 1982 | 40,775 | 20.0 | Vibriosis Vaccination | — | 1 | 182 | 2 | 205 | 0 | 433 | 0 | 823 | 2.018 |
| 10/24/13 | 1982 | 40,500 | 20.0 | Control | | 2 | 172 | 2 | 188 | 0 | 395 | 0 | 759 | 1.874 |
| 10/24/58 | 1983 | 62,100 | 20.3 | Hatchery Evaluations | -- | -- | -- | -- | 126 | 0 | 468 | 0 | 594 ^b | 0.957 |
| 10/27/38 | 1984 | 50,000 | 15.8 | Hatchery Evaluations | -- | -- | -- | -- | -- | -- | 117 | 0 | 117 ^b | 0.234 |

^aIncludes known commercial, sport, and Indian harvest, and other trapping sites.

^bAdditional returns expected in future.

Table 10. Release dates for DNFH reared spring chinook salmon (brood year 1983).

| Release date____ | Stock/ lot number | Number | Size (No./ (lb) | weight (lbs) | Mean fork length (in.) | Condition factor K (10 ⁻⁶) |
|---------------------|--------------------------|-----------|-----------------------|-----------------|---------------------------|--|
| April 3-4 | Little white/ 3-LW-2a | 57,513 | 14.41 | 3,992 | 5.7 | 8.43 |
| April 3-4 | Little white/ 3-LW-2b | 713,835 | 23.53 | 30,338 | 4.8 | 8.00 |
| April 3-4 | Leavenworth/ 3-Le-2 | 365,791 | 20.74 | 17,636 | 5.0 | 8.05 |
| Totals | | 1,137,139 | 21.88 | 51,966 | 5.2 | 8.16 |

A total of 334 adult chinook salmon returned to Dworshak National Fish Hatchery in 1985. None of these fish were coded wire tagged. Smolts have not been coded wire tagged at Dworshak National Fish Hatchery to date for the LSRCP program. Spawning occurred from August 19 through September 6.

Sawtooth Fish Hatchery

In January of 1985, hatchery personnel moved approximately 55,000 spring chinook fry into the hatchery vats. The remaining 1984 brood year fry, a total of 517,603, were received by the end of April from the Pahsimeroi Hatchery which incubated, hatched, and early reared these fry from eggs taken at the Sawtooth and East Fork sites. A total of 341,324 Sawtooth and 112,008 East Fork fish will be released in the spring of 1986. Eighty-one thousand of the Sawtooth group have been tagged, and 38,000 of these have been branded for future studies.

As mentioned previously in this report, in March of 1985 McCall Hatchery planted 420,060 chinook smolts at the Sawtooth site from brood year 1983 (Table 11). These included 79,350 fish with adipose clips and coded wire tags (tag 10/26/34--41,200 released and tag 10/26/35--39,513 released). In addition, Hagerman National Hatchery planted 784,096 steelhead "A" smolts at the Sawtooth site and 270,208 steelhead "B" smolts at the East Fork site.

We began trapping adult steelhead in April of 1985 at both the Sawtooth and East Fork facilities (Table 12). Five hundred twenty-six steelhead were trapped at the Sawtooth site, which provided 1,516,294 green "A" eggs and 102,461 green "B" eggs. The East Fork facility trapped 77 adult steelhead for a green egg take of 122,612 "A" eggs and 7,128 "B" eggs. We shipped 1,102,079 eyed "A" eggs and 601,419 eyed "B" eggs to Hagerman National Hatchery for rearing. Pahsimeroi Hatchery also sent a total of 2,613,679 green "A" eggs, of which 2,219,772 were planted as button-up fry in the upper Salmon River tributaries. Pahsimeroi also sent 619,130 green "B" eggs, which were included with shipments of "B" eggs to Hagerman National Hatchery.

Spring chinook salmon trapping began in June this season with a total of 1,639 adults trapped at Sawtooth and 303 adults trapped at the East Fork facility (Table 13). Adults trapped at Sawtooth included: 296 jacks, 1,151, four year olds, and 192 five year old fish. Adults trapped at the East Fork included: 31 jacks, 213 four year olds, and 59 five year old fish. We spawned 313 females at Sawtooth for a green egg take of 1,367,344. There were 44 females spawned at the East Fork site for a total green egg take of 244,498. Additional eggs from Rapid River Hatchery were received at Sawtooth.

The 1984-85 coded wire tag data for Sawtooth Hatchery and East Fork trap are listed (Table 14). All groups should have additional returns in 1986.

Table 11. Summary of fish released by Sawtooth Hatchery, 1985.

| Species | Brood year | Mark | Total marked released | Size at release (per/lb.) | Date(s) released | Release site | Total release | Marked group code and season |
|----------------------|------------|----------|-----------------------|---------------------------|------------------|-----------------------------|---------------|-------------------------------|
| Spring chinook | 1983 | Ad/CWT | 41,200 | 22.5 | 3/25-29 | Sawtooth Hatchery | | 10/26/34 Hatchery Evaluations |
| Spring chinook | 1983 | Ad/CWT | 38,150 | 22.5 | 3/25-29 | Sawtooth Hatchery | | 10/26/34 Hatchery Evaluations |
| Spring chinook | 1983 | RD "R"-1 | 39,875 | 22.5 | 3/25-29 | Sawtooth Hatchery | | water budget |
| Spring chinook | 1983 | | | 22.5 | 3/25-29 | Sawtooth Hatchery | 300,835 | |
| Steelhead A | 1985 | | | 2,300 | 7/1-22 | Yankee Fork Creek | 250,000 | |
| Steelhead A | 1985 | | | 2,300 | 7/1-22 | Altures Lake Creek | 181,420 | |
| Steelhead A | 1985 | | | 2,300 | 7/1-22 | Valley Creek | 128,092 | |
| Steelhead A | 1985 | | | 2,300 | 7/1-22 | Redfish Lake Creek | 164,379 | |
| Steelhead A | 1985 | | | 2,300 | 7/1-22 | Pole Creek | 488,437 | |
| Steelhead A | 1985 | | | 2,300 | 7/1-22 | West Fork Yankee Fork Creek | 250,985 | |
| Steelhead A | 1985 | | | 2,300 | 7/1-22 | Frenchman Creek | 103,474 | |
| Steelhead A | 1985 | | | 2,300 | 7/1-22 | Upper Salmon River | 503,170 | |
| Steelhead A | 1985 | | | 2,300 | 7/1-22 | Basin Creek | 118,203 | |
| Steelhead B | 1985 | | | 2,300 | 7/1-22 | East Fork | 31,612 | |
| Total chinook smolts | | | | | | | 420,060 | |
| Total steelhead fry | | | | | | | 2,219,772 | |

Table 12. Adult return summary for anadromous fish released by Sawtooth Hatchery, 1985.

| Species | Recapture location | Males | Females | Total | Released upstream | |
|----------------|--------------------|-------|---------|-------|-------------------|---------|
| | | | | | Males | Females |
| Spring chinook | Sawtooth Hatchery | 1,082 | 557 | 1,639 | 445 | 180 |
| Spring chinook | East Fork trap | 240 | 63 | 303 | 124 | 18 |
| Steelhead | Sawtooth Hatchery | 149 | 377 | 526 | 114 | 92 |
| Steelhead | East Fork trap | 43 | 30 | 77 | -- | -- |

Table 13. Trapping summary of spring chinook salmon on the Salmon River at Sawtooth Hatchery.

| Year | Weir installed | Weir removed | Males | | Females | Total | Released upstream | |
|------|----------------|--------------|---------|--------------|---------|-------|-------------------|---------|
| | | | 1-ocean | 2- & 3-ocean | | | Males | Females |
| 1981 | June 25 | September 9 | 23 | 257 | 449 | 729 | -- | 255 |
| 1982 | June 29 | September 26 | 16 | 135 | 111 | 262 | -- | 12 |
| 1983 | July 19 | September 6 | 17 | 170 | 179 | 366 | 78 | 19 |
| 1984 | July 7 | September 6 | 76 | 142 | 187 | 405 | 140 | 65 |
| 1985 | June | September | 296 | 786 | 557 | 1,639 | 445 | 180 |

Table 14. Summary of 1984-85 coded wire tag returns for Sawtooth Hatchery and East Fork trap area releases.

| Species | Tag code | Marks released | Size at release (per/lb.) | Date released | Release site | Purpose | Returns | | | | | |
|----------------|----------|----------------|---------------------------|-------------------|-----------------------------|--|-------------------|---------------------|-------------------|-------------------|-----------------|----------------|
| | | | | | | | Fall 1984 harvest | Spring 1985 harvest | Release site 1984 | Release site 1985 | Total return | Percent return |
| Steelhead "A" | 5/13/33 | 40,573 | 2.1 | April 18-2n, 1983 | Salmon River above Sawtooth | "Size at release" large \bar{x} = 10.2 in. | 16 | 10 | | 17 | 43 ^a | 0.11 |
| Steelhead "A" | 5/13/34 | 40,548 | 5.3 | April 18-20, 1983 | Same as above | "Size at release" small \bar{x} = 8.2 in. | 7 | 0 | | 2 | 98 | 0.02 |
| Spring chinook | 10/24/8 | 35,075 | 28.7 | March 29, 1983 | Same as above | Hatchery evaluations | | | 2 | 50 | 52 ^a | 0.14 |
| Spring chinook | 10/25/35 | 51,450 | 28.7 | March 29, 1983 | Same as above | Hatchery evaluations | | | 2 | 68 | 70 ^a | 0.14 |
| Spring chinook | 10/27/8 | 51,025 | 17.0 | March 27, 1984 | Same as above | Hatchery evaluations | | | | 83 | 83 ^a | 0.16 |
| Spring chinook | 10/27/9 | 50,600 | 17.0 | March 27, 1984 | Same as above | Hatchery evaluations | | | | 71 | 71 ^s | 0.14 |
| Steelhead "8" | 10/24/60 | 37,600 | 3.6 | April 12-13, 1983 | E. Fork Salmon River | Stock evaluation | 0 | 0 | | 3 | 3 ^s | 0.01 |

^aAdditional returns expected in the future.

Magic Valley Steelhead Hatchery

No fish were reared at the hatchery this year. The hatchery water was turned off at the request of the Corps of Engineers to allow the water table to reach its natural level for hatchery design and construction. Fish will most likely not be reared here until late fall of 1986 or spring of 1987 depending upon construction progress.

During the 1984-85 fish year, Hagerman National Fish Hatchery reared 232,000 steelhead in lieu of the Magic Valley Hatchery Program (Table 15). These fish were reared in the trout section of Hagerman National Fish Hatchery. This process will continue until such time as Magic Valley Steelhead Hatchery begins production.

Hagerman National Fish Hatchery

The distribution of brood year 1984 "A" and "B" steelhead was completed on May 1, 1985 (Table 16). A total of 1,364,496 steelhead smolts at 4.4 per pound were planted. These include the 232,000 steelhead reared for Magic Valley Steelhead Hatchery. The planned production was 1,412,000 smolts at 4.1 per pound. Actual distribution was short 3% on numbers and 10% on weight. A total of 128,229 fall chinook at 48.9 per pound were planted in the Snake River near the Grande Ronde. Included in this group were 56,327 with coded wire tags (5/13/53).

Table 15. Numbers and pounds of steelhead reared at Hagerman National Fish Hatchery for Magic Valley Steelhead Hatchery program, 1985.

| Strain | Number | Pounds | Fish per pound | Planting site | Date planted |
|--------|---------|--------|-------------------|--------------------------------|----------------------|
| A | 133,099 | 29,415 | 4.5 | Salmon River at Sawtooth H. | March 26- April 5 |
| A | 89,688 | 21,625 | 4.2 | L. Salmon at Hazard Creek | April 15- May 1 |
| B | 9,204 | 1,950 | 4.7 | E. Fork Salmon River | April 29 |
| Total | 231,991 | 52,990 | Avg 4.34 | | |

Table 16. Summary of fish released by Hagerman National Fish Hatchery, 1985.

| Species Release | Stock Number | Brook year Number | Release site Marks | date | released | per lb. | Marks | released |
|--------------------|----------------------|-------------------------|-----------------------|-------------------------|----------|---------|------------------|----------|
| Fall chinook | Snake River | 1984 | Snake River | 6/4/85 | 128,229 | 48.9 | 5/13/53 FB | 56,327 |
| Fall chinook | Snake River | 1984 | Snake River | 6/4/85 | | 48.9 | L.D. "R"-4 | 33,700 |
| Steelhead A | Hells Canyon | 1984 | Hazard Creek | 4/25/85 to 5/1/85 | 308,103 | 4.2 | 10/26/32 | 39,175 |
| Steelhead A | Sawtooth Hatchery | 1984 | Sawtooth | 4/9/85 to 4/24/85 | 786,186 | 4.4 | 10/26/30 | 40,475 |
| Steelhead A | Sawtooth Hatchery | 1984 | Sawtooth | 4/9/85 | | | FB R.D. "Y"-1 | 35,125 |
| Steelhead B | Salmon River | 1984 | East Fork Salmon | 3/26/85 to 4/ 29/ 85 | 270,207 | 4.8 | 10/26/55 | 17,425 |
| Steelhead B | Salmon River | 1984 | East Fork Salmon | 4/10/85 to 4/12/85 | | | 10/26/31 | 39,375 |
| Steelhead B | Salmon River | 1984 | East Fork Salmon | 4/10/85 to 4/12/85 | | | 10/26/36 | 35,225 |
| Steelhead B | Salmon River | 1984 | East Fork Salmon | 4/10/85 to 4/12/85 | | | 10/28/2 | 25,050 |
| Steel head B | Salmon River | 1984 | East Fork Salmon | 4/10/85 to 4/ 12/ 85 | | | 10/28/3 | |
| Steelhead B | Salmon River | 1984 | East Fork Salmon | 4/29/85 | | | 10/28/54 | 25,525 |

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A P P E N D I X

Appendix A. Information on coded wire tagged groups of steelhead released by Hagerman National Fish Hatchery, 1985.

| Strain | Tag group | Release date | Release location | Number released | Mean length (in.) | Sample size | Reason for mark |
|--------|-----------|--------------|-------------------|-----------------|-------------------|-------------|---|
| B | 10/26/55 | March 26 | East Fork | 17,425 | 8.1 | 203 | Early-release |
| A | 10/26/30 | April 9 | Sawtooth Hatchery | 40,475 | 8.4 | 344 | "Time-of-release" Return-to-site |
| B | 10/26/31 | April 10 | East Fork | 39,375 | 8.4 | 300 | Control for "Pro Polyaqu" transport study |
| B | 10/26/36 | April 10 | East Fork | 35,225 | 8.4 | 300 | "Pro Polyaqu" transport study |
| B | 10/28/2 | April 12 | East Fork | 25,050 | 8.4 | 312 | Mid-release "Time-of-release" |
| B | 10/28/54 | April 29 | East Fork | 25,525 | 8.3 | 312 | Late release "Time-of-release" |

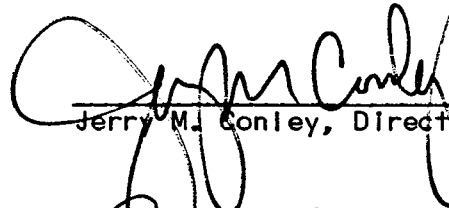
Submitted by:

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Approved by:

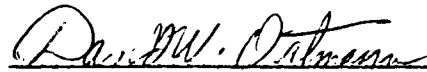
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